

LA-UR-21-24981

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Title: RCT Continuing Training: 2nd Quarter 2021 Online Presentation

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RCT Continuing Training: 2nd Quarter 2021

1. Main Scene

1.1 Main Slide



RCT Continuing Training:
2nd Quarter 2021

Section 1: Item Removal

- This section will review the fundamental elements of removing items from controlled areas. Starting with the evaluation process, we will discuss the necessary actions to take to determine if an item may be released from a controlled area.

Section 2: Area Radiation Monitors

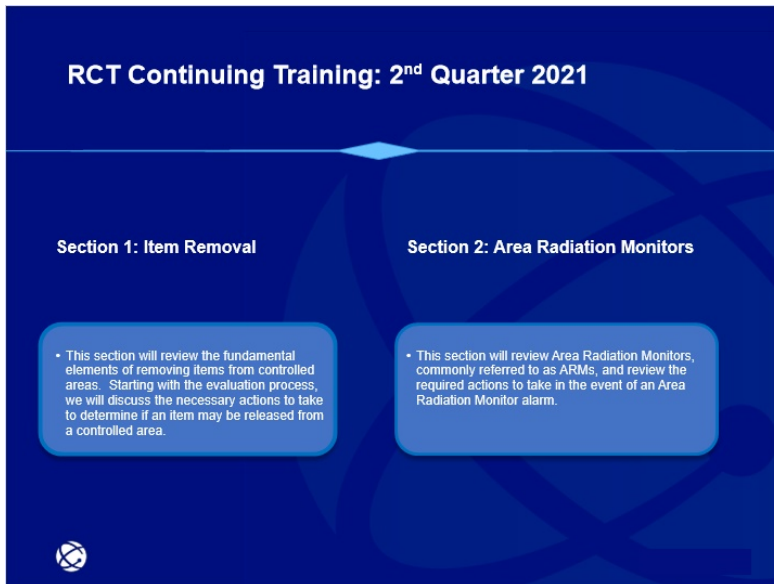
- This section will review Area Radiation Monitors, commonly referred to as ARMs, and review the required actions to take in the event of an Area Radiation Monitor alarm.

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1.2 Contents Page




RCT Continuing Training: 2nd Quarter 2021

Section 1: Item Removal

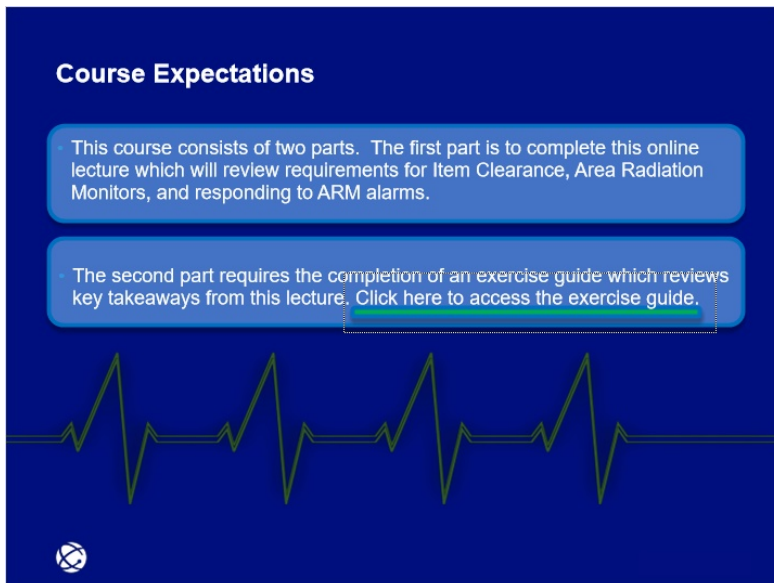
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Section 2: Area Radiation Monitors

- This section will review Area Radiation Monitors, commonly referred to as ARMs, and review the required actions to take in the event of an Area Radiation Monitor alarm.





1.3 Course Expectations



Course Expectations

- This course consists of two parts. The first part is to complete this online lecture which will review requirements for Item Clearance, Area Radiation Monitors, and responding to ARM alarms.
- The second part requires the completion of an exercise guide which reviews key takeaways from this lecture. [Click here to access the exercise guide.](#)







1.4 Course Credit

Course Credit



- To receive credit for this course, you must view the entirety of this presentation. Upon completion, credit for the online portion should reflect immediately in U-Train.
- Afterwards, you will need to work through the exercise guide, and return the completed document to RP-Training@lanl.gov. Submittals will be reviewed and credit assigned.



1.5 What's In It for Me?

What's In It For Me?

- As an RCT, you are responsible for proper clearance of items and are a resource to our customer on this matter. This training will refresh you on the requirements associated with the various kinds of item release and required documentation to release items from radiological control.
- Additionally, you may be called on to work in areas and on jobs that have Area Radiation Monitors (ARMs). This training will refresh you on the fundamentals of ARMs and how to respond to alarms.





1.6 Terminal Learning Objectives

Terminal Learning Objectives

TO1: Given the need to perform duties as a RCT, recognize the requirements for item removal in accordance with RP-PROG-TP-200, *Radiation Protection Manual* and P121, *Radiation Protection*.

TO2: Given an area radiation monitor alarm, recognize the response requirements of a RCT in accordance with RP-PROG-TP-201, *Radiological Emergency Response*.



1.7 Enabling Learning Objectives

Enabling Learning Objectives

EO1: Define the terms related to item removal.


EO2: Given radiological conditions determine the item clearance class.

EO3: Identify when item removal surveys are required.

EO4: Describe the use of process knowledge for item release.

EO5: Explain the process for free release.


EO6: Review the process to release an item with detectable activity less than table 14-2 values.



1.8 Enabling Learning Objectives Continued

Enabling Learning Objectives


- EO7: List the information to include on an HPRMS tag when detectable activity is greater than table 14-2 values.
- EO8: Locate the requirements for packaging and storing radioactive material.
- EO9: Indicate the time an item requires resurvey when awaiting removal following a free release survey.
- EO10: Explain the process for conditional release.
- EO11: Describe the initial and supplemental response actions when responding to an area radiation monitor alarm.



1.9 RCT Continuing Training: 2nd Quarter 2021

RCT Continuing Training: 2nd Quarter 2021

- Section 1: Item Removal
- Section 2: Area Radiation Monitors



2. Item Release

2.1 Lujan Center 1



2.2 Lujan Center 2

Industry Event – Lujan Center Event

- The process in place in this facility included a RCT to survey and release OR control the material after irradiation, but was not understood to be required at the time.
- Typically, opening of containers with dispersible material was to be done inside of a glove-box with RCT coverage.
- After being in storage for some time, this container was disassembled for reuse by one of the workers on a bench-top without RCT coverage, which initiated the inevitable chain of events that followed.



Figure 1: Lutetium-Technetate sample container



2.3 Lujan Center 3

Industry Event – Lujan Center Continued 1

- Contamination spread to various facilities at LANL.
- 25 individuals were found to have contaminated personal items.
- 5 individuals were found to have skin contamination.
- RAP team was deployed to survey areas ranging across CO, AZ, and NM.
- At least 9 homes in NM were found to have Tc-99 contamination.
- All individuals were determined to receive less than one mrem total dose.

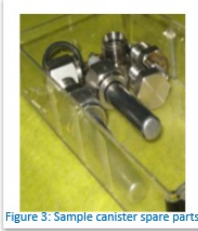


Figure 3: Sample canister spare parts



Figure 2: Sample canister similar to the one used for Lu-Tc



2.4 Lujan Center 4

Industry Event – Lujan Center Event

- The federal investigation concluded with twenty-nine total contributing factors to this event. We can take a look at these to understand and compare to the processes we have in place today.
- A few major contributors were:
 - Inadequate storing and labeling of material.
 - Informal and inconsistent established work controls.
 - Culture where deviation from procedures normalized.



[Click on the picture to learn more about this event](#)



2.5 Lujan Center 5

Industry Event – Lujan Center Event

- Is the process we have in place right now sufficient to prevent release of radioactive material?
- Properly labeling and storing will prevent mishandling of material that should be controlled. Workers in the Lujan Center now have a streamlined process to control and maintain accountability for all potentially radioactive material.
- Consistently adhering to item release standards will give multiple layers of protection against an unintended release.
- How we apply process knowledge and thoroughness of surveys are vital to prevent any potential for radioactive material to reach the public. This last line of defense falls on RCTs as they evaluate each item in this process. In this presentation we will review the basic elements that go into item removal.



2.6 Item Removal Terms

Section 1:

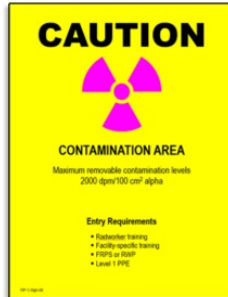
Item Removal

2.7 Release Definition

Item Removal - Release

Definition: Applies to item removal from a:

- Contamination Area (CA)
- High Contamination Area (HCA)
- Airborne Radioactivity Area (ARA)
- Radiological Buffer Area (RBA)
- Radiological Controlled Area (RCA)



Notes: EO1: Describe the terms related to item removal

2.8 Free-Release Definition

Item Removal – Free-Release or Clearance

- Applies to any unrestricted release of items to the public from an RBA RCA.
- Must also meet "release" requirements.
- The terms "free-release" and "clearance" are equivalent.
- LANSCE metals clearance is a special category of clearance, covered by a documented technical basis and procedure RP-SOP-077, *LANSCE Unrestricted Release of Metals Survey Process*.

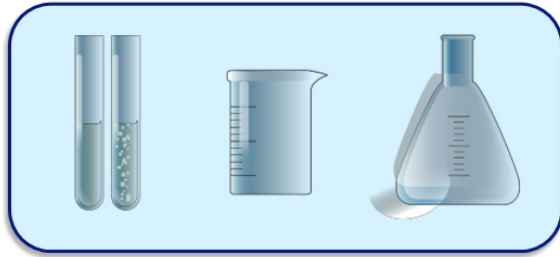


Notes: EO1: Describe the terms related to item removal

2.9 Conditional Release Definition

Item Removal – Conditional Release

- Applies to movement on-site from one radiological area for immediate placement into another radiological area.

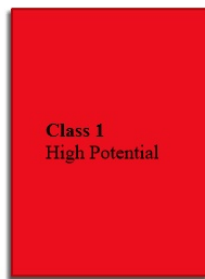


Notes: EO1: Describe the terms related to item removal

2.10 Item Clearance Classes

Item Clearance

- Item clearance requirements depend on the location of the item, including government vehicles operated in these areas. RP-PROG-TP-200, Section 1435, Table 11 establishes item clearance classes for free-release based on location.



Notes: EO2: Given radiological conditions determine the item clearance class

2.11 Class 1

Item Clearance – Class 1

- High potential; may be above limits—applicable areas:
 - Radiological Controlled Areas (RCAs) for contamination (including CAs, HCAs, ARAs, and RBA-Cs)
 - RCAs for Depleted Uranium (DU) shrapnel
 - RCAs for volume contamination
 - Solid Waste Management Units (SWMUs)
 - Areas of Concern (AOCs) (could also be Class 2 area)



Notes: EO2: Given radiological conditions determine the item clearance class

2.12 Class 1 Surveys

Item Clearance Surveys – Class 1

- In accordance with RP-PROG-TP-200, Section 1435.6.2a, Items leaving these areas must be surveyed for contamination unless they meet the following specific requirements to be released on process knowledge alone.



Notes: EO3: Identify when item removal surveys are required

2.13 Class 1 Surveys Continued

Item Clearance Surveys – Class 1

- Hand-carried personal items (e.g., notebooks, pagers, and flashlights) only if ALL of the following conditions are true:
 - Items have not come into contact with any potentially contaminated surfaces.
 - Items have not entered a CA, HCA, or ARA.
 - Items have not left the direct possession of the individual.
 - The individual is free from contamination as determined by a properly conducted frisk.



Notes: EO3: Identify when item removal surveys are required

2.14 Class 2

Item Clearance – Class 2

- Some potential; but likely below limits—applicable area:
 - RCAs for legacy contamination



Notes: EO2: Given radiological conditions determine the item clearance class

2.15 Class 2 Surveys

Item Clearance Surveys – Class 2

- The individual requesting item release must determine whether the item is affected by legacy contamination.
- IF the requestor determines the item is not affected by legacy contamination, THEN the item may be released without survey based on process knowledge, AND no documentation is required.
- IF the item is affected by legacy contamination, THEN the item must be evaluated and surveyed.



Notes: EO3: Identify when item removal surveys are required

2.16 Class 3

Item Clearance – Class 3

- No contamination expected, but possible—applicable areas:
 - RCAs for external radiation
 - RCAs for radioactive material
 - Uncontrolled areas

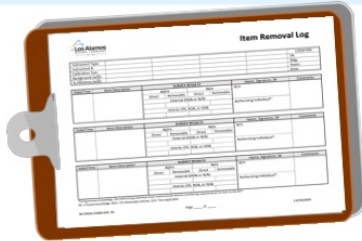


Notes: EO2: Given radiological conditions determine the item clearance class

2.17 Class 3 Surveys

Item Clearance Surveys – Class 3

- The individual requesting item release must determine whether there are any obvious indications of radiological use history for the item (e.g., tags, labels, known radiological use).
- IF there is no obvious indication of radiological use history, THEN the item may be released without survey based on process knowledge, AND no documentation is required.
- IF there is obvious indication of radiological use history, THEN the item must be evaluated and surveyed.



Notes: EO3: Identify when item removal surveys are required

2.18 Process Knowledge

Process Knowledge

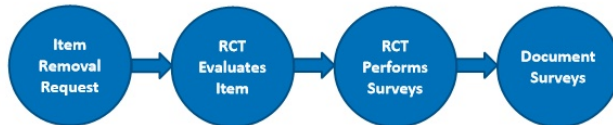
- IF the requestor uses process knowledge for item clearance, then you must consider operational records and operating history, including the use of any radioactive materials or radiation generating devices.
- IF process knowledge is used as the sole basis for item clearance, THEN process knowledge must determine the following:
 - Whether the item was ever used for activities or in areas that could have caused internal or external contamination.
 - Whether previously contaminated items were decontaminated, met release limits, and were protected from re-contamination.
- IF process knowledge cannot demonstrate that the items are NOT contaminated, THEN surveys must be conducted.

Notes: EO4: Describe the use of process knowledge for item release


2.19 Item Release Review

Item Clearance

- Let's take a minute to review the major steps that makeup the item removal process from the perspective of an RCT.



2.20 RP-PROG-FORM-024



Item Removal Log

Instrument Type:					LOCATION
Instrument #:					TA:
Calibration Due:					Bldg:
Background (a/b):					Room:
% Efficiency (a/b):					Area:

Date/Time	Item Description	SURVEY RESULTS				Name, Signature, Z#	Comments
		Alpha		Beta		RCT: Authorizing Individual*:	
		Direct	Removable	Direct	Removable		
		External (NDA or N/A)					
		Interior (PK, NDA, or N/A)					

Date/Time	Item Description	SURVEY RESULTS				Name, Signature, Z#	Comments
		Alpha		Beta		RCT: Authorizing Individual*:	
		Direct	Removable	Direct	Removable		
		External (NDA or N/A)					
		Interior (PK, NDA, or N/A)					

Date/Time	Item Description	SURVEY RESULTS				Name, Signature, Z#	Comments
		Alpha		Beta		RCT: Authorizing Individual*:	
		Direct	Removable	Direct	Removable		
		External (NDA or N/A)					
		Interior (PK, NDA, or N/A)					

*Using process knowledge, the authorizing individual must communicate interior monitoring requirements for item to the RCT.
PK = Process Knowledge, NDA = No Detectable Activity, N/A = Not Applicable

RP-PROG-FORM-024, R1 Page ____ of ____ 11/20/2020

2.21 Item Release Video

Item Removal Demonstration

Let's observe the required actions for an RCT during this process. The transfer is limited to 60 seconds and the release is dependent on the results of the survey. An RCT has been requested to survey several tools for removal from a contamination is found within the limits of P121, Table Radiological Controlled Area. The nuclide of concern here is uranium.

14-2

Notes: EO5: Explain the process for free release when given an item release scenario

2.22 Item Release with detectable activity

Item release Below Table 14-2

RP-PROG-TP-200, Section 1435 states that, If any item with detectable activity is to be released, then a deployed RP lead and the requestor must concur on both of the following:

- Release limits have been met.
- Reasonable measures to decontaminate the items have been applied.



Notes: EO6: Review the process to release an item with detectable activity less than table 14-2 values

2.23 HPRMS Tags

HPRMS Tags

Information to include on a HPRMS tag:

- Instrument manufacturer
- Instrument model
- Instrument number
- Calibration due date
- HPAL barcode number(s) if applicable
- Location
- Description
- Primary radionuclides
- Check applicable contamination category
- Circle "Material" or "Inner Container"
- Survey results
- Comments or specific controls
- Print name, sign, AND date form
- HPFC review and signature if leaving LANL property



Notes: EO7: List the information to include on an HPRMS tag when detectable activity is greater than table 14-2 values

2.24 Filling out an HPRMS Tag

HPRMS Tags

Instrument manufacturer
Instrument model
Instrument number
Calibration due date
HPAL barcode number(s) if applicable
Survey results - note for contamination category
Circle "Material" or "Inner Container"
Enter NDA if no detectable activity is found for the applicable field



Instruments Used			
Instrument Type	HSE Number	Cal. Due Date	
Geiger 4020	121234	12/12/21	
Endress 4020	121234	12/12/21	
HPAL Barcode			
Barcode Number (s): 29241234			
Tech Area/Location: TA-00-1197		Tag Number: C 54649	
Item Description: 10ml glass sample vial # C660-3234			
Radionuclide (s): Cs-137			
Check Categories that apply:			
<input type="checkbox"/> Fixed Contamination	<input type="checkbox"/> Volume Contamination/Activation		
<input type="checkbox"/> Surface Contamination	<input type="checkbox"/> Potential Internal Contamination		
<input checked="" type="checkbox"/> Radioactive Material/Source	<input type="checkbox"/> Internal Contamination		
Contamination Survey of Material (Inner Container (circle one))			
Direct			
CI: N/A	dpm/100cm ²	CI: NDA	dpm/100cm ²
FI: N/A	dpm/100cm ²	FI: NDA	dpm/100cm ²
Within			
Radiation Survey of Material (Outer Container)			
At Contact			
FI: γ + N	0.5	mRem/hr	NDA
Removable Contamination Survey of Package (Outer Container)			
CI: NDA			
FI: γ			
External Radiation Survey of Package (Outer Container)			
At Contact			
FI: γ + N			
Comments / Controls			
NDA mRem/hr @ 3Meters			
RCT Z Number: 123456			
Survey Date: 04/27/21			
Supervisor: [Signature]			

Notes: EO7: List the information to include on a HPRMS tag when detectable activity is greater than table 14-2 values.

2.25 Filling out an HPRMS Tag Continued

HPRMS Tags

- Remove original copy by tearing at perforated line.
- Maintain original as a survey record
- Attach yellow cardstock tag to item.
- Provide customer with a copy if requested



Instruments Used		
Instrument Type	HSE Number	Cal. Exp. Date
Eberline RO20	121234	12/12/21
RadexSV/43-93	121345	12/24/21
HPRMS Results		
Bar Code Number (ID)	29241234	
Test Area/Location	TA-00-1197	Tag Number: C 54649
Item Description	10ml glass sample vial # Co60-1234	
Radionuclide (s)	Co-60	
Check Categories that apply:		
<input type="checkbox"/> Panel Contamination	<input type="checkbox"/> Volume Contamination/Activation	
<input type="checkbox"/> Surface Contamination	<input type="checkbox"/> Potential Internal Contamination	
<input checked="" type="checkbox"/> Radioactive Material/Source	<input type="checkbox"/> Internal Contamination	
Contamination Survey of Material (inner container/circle one)		
Direct	Indirect	
CI N/A dpm/100cm ²	CI N/A dpm/100cm ²	
BI/γ N/A dpm/100cm ²	BI/γ N/A dpm/100cm ²	
W/Item N/A dpm/100cm ²		
Radiation Survey of Material/Inner Container		
At Contact	At 30 cm (1 ft.)	
BI/γ + N 0.3 mRem/hr	NDA mRem/hr	
Removable Contamination Survey of Packaging (outer container)		
CI N/A dpm/100cm ²	BI/γ N/A dpm/100cm ²	
External Radiation Survey of Packaging (outer container)		
At Contact	At 30 cm (1 ft.)	
BI/γ + N NDA mRem/hr	NDA mRem/hr	
Comments / Controls		
NDA mRem/hr @ 1Meter		
RCT Z Number:	123456	Signature: <i>John Smith</i>
Survey Date:	04/27/21	Supervisor:

2.26 Packing and Storing RAM

Packaging and Storing Radioactive Material

P121 Radiation Protection, Section 1722.3:

- Radioactive material must be packaged and stored so that the package integrity is maintained to prevent the release of contamination; higher risk materials require more robust packaging.



Notes: EO8: Locate the requirements for packaging and storing radioactive material

2.27 Packaging and Storing RAM Continued

Packaging and Storing Radioactive Material Continued

Factors to consider:

- Source term
- Area designation
- The storage area
- Package integrity
- Sharp edges
- Potential for individuals to be exposed to compromised storage packaging
- ALARA measures



2.28 Removing Items after Survey

Removing Items After Survey

IF not released promptly after surveys, THEN the Deployed RP Lead (DRPL) must be consulted to ensure that appropriate controls are implemented.



Notes: EO9: Indicate the time an item requires resurvey when awaiting removal following a free release survey

2.29 Conditional Release

Conditional Release

- We know that if an item cannot be decontaminated below the limits of P121, Table 14-2, that it cannot be free-released. Some items may still have a useful purpose and should not be disposed of as radioactive waste. A conditional release allows you to move items like this between Radiological Controlled Areas, given that the proper monitoring and controls are exercised.



Notes: EO10: Explain the process for conditional release when given a conditional release scenario

2.30 LANL Event 1

LANL Event - 2020

2.31 LANL Event 2

LANL Event – Contaminated Detectors Released

- Detector one was found to have 600 dpm/smear.
- Detector two was found to have 1,000 dpm/smear.
- Instruments tagged out of service are marked surveyed below 14-2 limits.



External surface is below P121, Table 14-2 levels

Date Surveyed: 11/11/10

HSE Div. PN #

Reason for Return:

☐ Calibration Due

☐ Failed Performance Test

☐ Repair (describe exact problem)



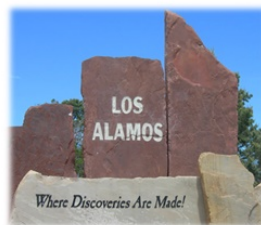
2.32 LANL Event 3

LANL Event – Contaminated Detectors Released

Luckily, no personnel or uncontrolled areas were found to be contaminated during this event. Corrective actions were implemented to prevent future issues.

Factors that could lead to an event like this:

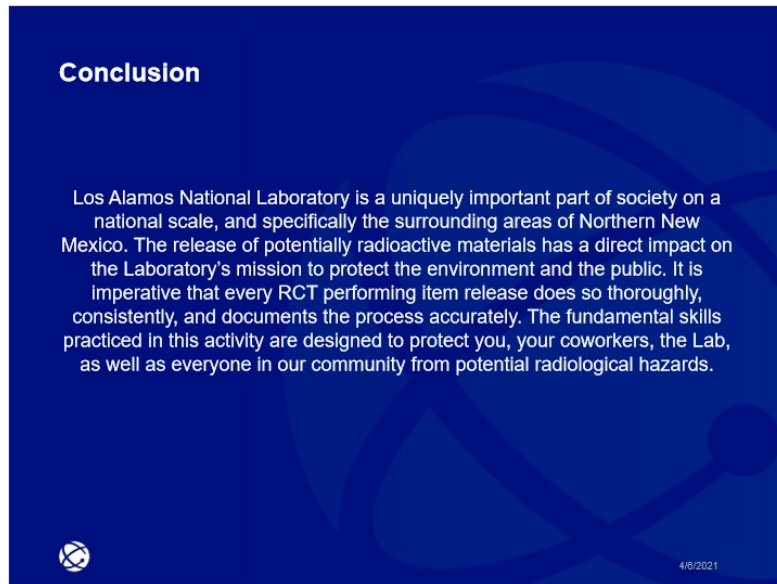
- Improper survey technique
- Violating procedure
- Inadequate training
- Complacency



[Click on the picture to learn more about this event](#)




2.33 Item Removal Summary



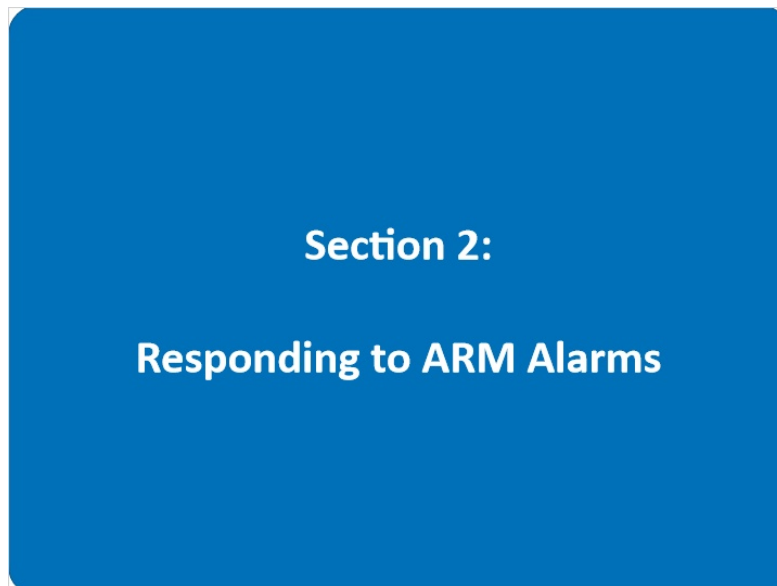
Conclusion

Los Alamos National Laboratory is a uniquely important part of society on a national scale, and specifically the surrounding areas of Northern New Mexico. The release of potentially radioactive materials has a direct impact on the Laboratory's mission to protect the environment and the public. It is imperative that every RCT performing item release does so thoroughly, consistently, and documents the process accurately. The fundamental skills practiced in this activity are designed to protect you, your coworkers, the Lab, as well as everyone in our community from potential radiological hazards.

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3. ARM Alarms

3.1 Area Radiation Monitors



Section 2:

Responding to ARM Alarms

3.2 ARM Alarm Initial Response

ARM Alarm Initial Response

RP-PROG-TP-201, Section 4.7.1, Initial Response Actions

- Ensure all personnel evacuate the area.
- Prevent personnel from entering the area.



Notes: EO11: Describe the initial and supplemental response actions when responding to an area radiation monitor alarm.

3.3 ARM Alarm Supplemental & Follow-Up

ARM Alarm Supplemental & Follow-Up Actions

RP-PROG-TP-201 Section 4.7.2 Supplemental Actions

- Obtain the names and Z numbers of all personnel in the area at the time of the alarm.
- Notify the HPFC, Team Leader, and management as appropriate, AND request assistance as needed.
- Management shall evaluate the potential for exposures and determine whether to expedite dosimetry results.
- Check ARM remote indicators if available.
- Determine the cause of the ARM alarm.
- Perform re-entry in accordance with Section 4.12, Re-Entry.

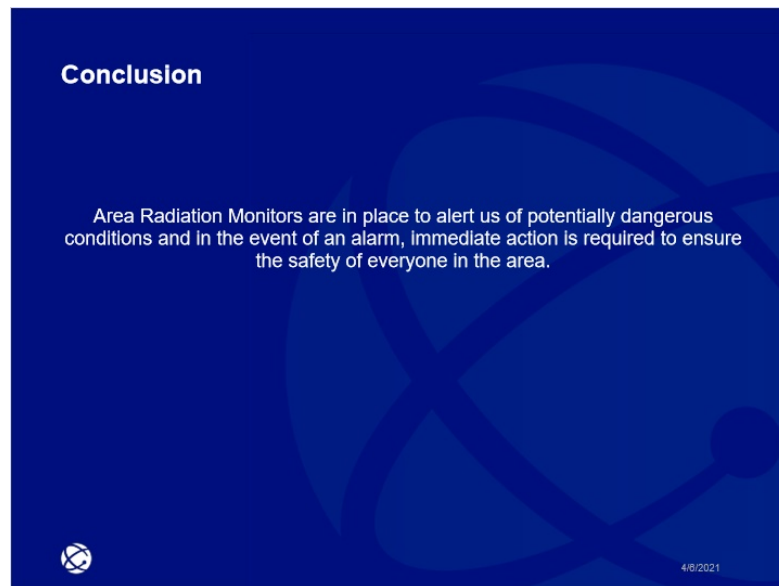
RP-PROG-TP-201 Section 4.7.3 Follow-Up Actions

- Initiate a Radiation Protection Initial Notification (RPIN).




Notes: EO11: Describe the initial and supplemental response actions when responding to an area radiation monitor alarm.

3.4 ARM Summary



Conclusion

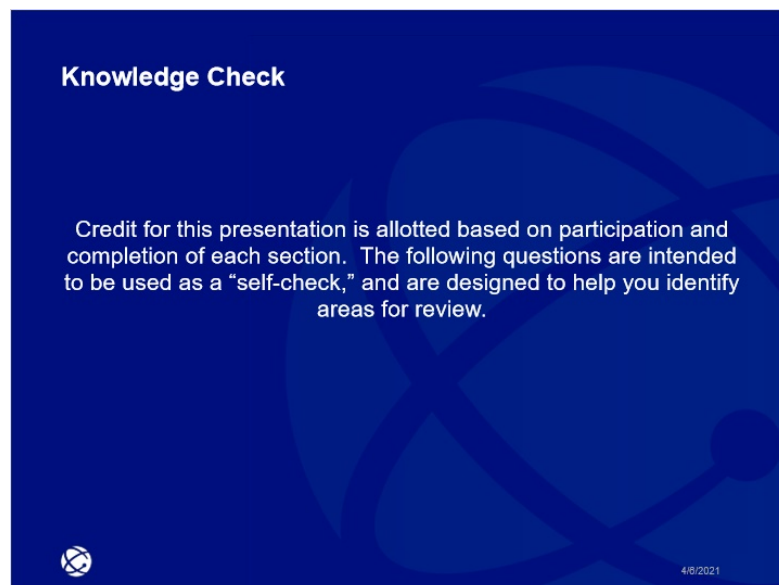
Area Radiation Monitors are in place to alert us of potentially dangerous conditions and in the event of an alarm, immediate action is required to ensure the safety of everyone in the area.



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4. Knowledge Check

4.1 Knowledge Check Intro



Knowledge Check

Credit for this presentation is allotted based on participation and completion of each section. The following questions are intended to be used as a "self-check," and are designed to help you identify areas for review.




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4.2 Question #1

(Matching Drag-and-Drop, 10 points, 1 attempt permitted)

Question #1
Drag each definition to match the correct term.

Conditional Release	Movement on-site from one radiological area for immediate placement into another radiological area.
Release	Item removal from a CA, HCA, ARA, RBA, or RCA for contamination.
Free Release	Any unrestricted release of items to the public from an RBA or RCA.
Clearance	Any unrestricted release of items to the public from an RBA or RCA.

 4/6/2021

Correct	Choice
Conditional Release	Movement on-site from one radiological area for immediate placement into another radiological area.
Release	Item removal from a CA, HCA, ARA, RBA, or RCA for contamination.
Free Release	Any unrestricted release of items to the public from an RBA or RCA.
Clearance	Any unrestricted release of items to the public from an RBA or RCA.

Feedback when correct: That's right! You selected the correct response.

Feedback when incorrect: Please take time to review key terms in RP-PROG-TP-200, Section 1435.

4.3 Question #2 (Multiple Choice, 10 points, 1 attempt permitted)

A customer asks you to survey a wrench that has been used and stored inside of a Radiological Buffer Area that is controlled for contamination. What clearance class is this item?

Question #2


A customer asks you to survey a wrench that has been used and stored inside of a Radiological Buffer Area that is controlled for contamination. What clearance class is this item?

☒ Class 1

☐ Class 2

☐ Class 3

☐ Class 4

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Correct	Choice
X	Class 1
	Class 2
	Class 3
	Class 4

Feedback when correct: That's right! You selected the correct response.

Feedback when incorrect: Class 1 areas have high potential for contamination such as RCA-C, RBA-C, CA, HCA, or ARA.

4.4 Question #3 (Hotspot, 10 points, 1 attempt permitted)

Based on potential for contamination, select the area below that would fall into item clearance class 2.

Question #3
Based on potential for contamination, select the area below that would fall into item clearance class 2.

The diagram illustrates different types of radiation areas. It features a large green L-shaped area labeled 'RCA - Legacy Contamination'. To its left is a red rectangular area labeled 'RCA/RMA'. Above the green area is a cluster of four smaller areas: a dark red square labeled 'HCA/RA', a medium red square labeled 'CA/RA', a light red square labeled 'RA', and a pink square labeled 'RCA/RBA - Contamination & External Radiation'. A red rectangular box is drawn around the 'CA/RA' and 'RA' areas, indicating the correct selection for item clearance class 2.

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Feedback when correct: That's right! You selected the correct response.


Feedback when incorrect: Class 2 areas have some potential to exceed the limits of P121, Table 14-2; and are typically RCAs controlled for legacy contamination.

4.5 Question #4 (Multiple Response, 10 points, 1 attempt permitted)

Select three of the following items that could be eligible for release based only on process knowledge.

Question #4
Select three of the following items that could be eligible for release based only on process knowledge.

- ☒ LANL badge worn outside Anti-C PPE for an entire workday inside of a RCA-Contamination.
- ☐ Hammer used inside of a CA for less than thirty minutes.
- ☐ Binder normally kept inside of RBA-Contamination boundary.
- ☒ Gas cylinder stored inside of RCA-External Radiation for one month.
- ☒ Safety glasses that were not removed during RCA tour.

 4/8/2021

Correct	Choice
X	LANL badge worn outside Anti-C PPE for an entire workday inside of a RCA-Contamination.
	Hammer used inside of a CA for less than thirty minutes.
	Binder normally kept inside of RBA-Contamination boundary.
X	Gas cylinder stored inside of RCA-External Radiation for one month.
X	Safety glasses that were not removed during RCA tour.

Feedback when correct: That's right! You selected the correct response.


Feedback when incorrect: Process Knowledge must demonstrate that the items are not possibly contaminated by meeting all stipulations of RP-PROG-TP-200, Section 1435.6.2a.

4.6 Question #5 (Sequence Drag-and-Drop, 10 points, 1 attempt permitted)

Arrange the steps below, in order to represent the general process leading to item release.

Question #5
Arrange the steps below, in order to represent the general process leading to item release.

- Item owner recognizes potential for contamination and requests evaluation by a RCT.
- RCT assesses process knowledge and determines applicable survey requirements.
- RCT performs all necessary surveys.
- RCT and requestor complete all required documentation as applicable.

 4/8/2021

Correct Order
Item owner recognizes potential for contamination and requests evaluation by a RCT.
RCT assesses process knowledge and determines applicable survey requirements.
RCT performs all necessary surveys.
RCT and requestor complete all required documentation as applicable.

Feedback when correct: That's right! You selected the correct response.


Feedback when incorrect: Please take time to review RP-PROG-TP-200, Section 1435.

4.7 Question #6 (Multiple Choice, 10 points, 1 attempt permitted)

When is HPFC review and signature required on a HPRMS tag?

Question #6
When is HPFC review and signature required on a HPRMS tag?

- ☐ Required on every tag.
- ☐ Only required when items include activity greater than P121 table 14-2.
- ☐ Never required.
- ☒ Required for items that are leaving LANL property.



4/8/2021

Correct	Choice
	Required on every tag.
	Only required when items include activity greater than P121 table 14-2.
	Never required.
X	Required for items that are leaving LANL property.


Feedback when correct: That's right! You selected the correct response.

Feedback when incorrect: HPFC signature is required when an item being shipped is to leave LANL property.

4.8 Question #7 (Word Bank, 10 points, 1 attempt permitted)

Packaging and storing requirements for radioactive material can be found in what section of P121, Radiation Protection?

Question #7
Packaging and storing requirements for radioactive material can be found in what section of P121, Radiation Protection?

 4/8/2021

Correct	Choice
X	1722
	1435
	624
	1811

Feedback when correct: That's right! You selected the correct response.


Feedback when incorrect: Packaging and storing requirements for RAM can be found in P121, Section 1722.

4.9 Question #8 (Multiple Choice, 10 points, 1 attempt permitted)

When should an item be removed from a controlled area following a free release survey.

Question #8
When should an item be removed from a controlled area following a free release survey.

- ☐ Within one month.
- ☐ Within fifteen minutes.
- ☒ Promptly, and in a manner that would not invalidate recent survey results.
- ☐ By the end of the day.

4/8/2021

Correct	Choice
	Within one month.
	Within fifteen minutes.
X	Promptly, and in a manner that would not invalidate recent survey results.
	By the end of the day.

Feedback when correct: That's right! You selected the correct response.

Feedback when incorrect: Best practice is to remove items immediately or as soon as possible.


4.10 Question #9 (Multiple Response, 10 points, 1 attempt permitted)

Survey results on an item are confirmed to be greater than the limits of P121, table 14-2. Select four of the best possible outcomes for this item.

Question #9

Survey results on an item are confirmed to be greater than the limits of P121, table 14-2. Select four of the best possible outcomes for this item.

- ☒ Tag as radioactive material and remain in a controlled area.
- ☒ Attempt to decontaminate and resurvey.
- ☐ Inform customer that this item is ready to be free released.
- ☒ Conditional release to another controlled area.
- ☐ Store in a Radiation Area.
- ☒ Dispose of as radioactive waste.
- ☐ Bury it somewhere in TA-03.

 4/8/2021

Correct	Choice
X	Tag as radioactive material and remain in a controlled area.
X	Attempt to decontaminate and resurvey.
	Inform customer that this item is ready to be free released.
X	Conditional release to another controlled area.
	Store in a Radiation Area.
X	Dispose of as radioactive waste.
	Bury it somewhere in TA-03.

Feedback when correct: That's right! You selected the correct response.

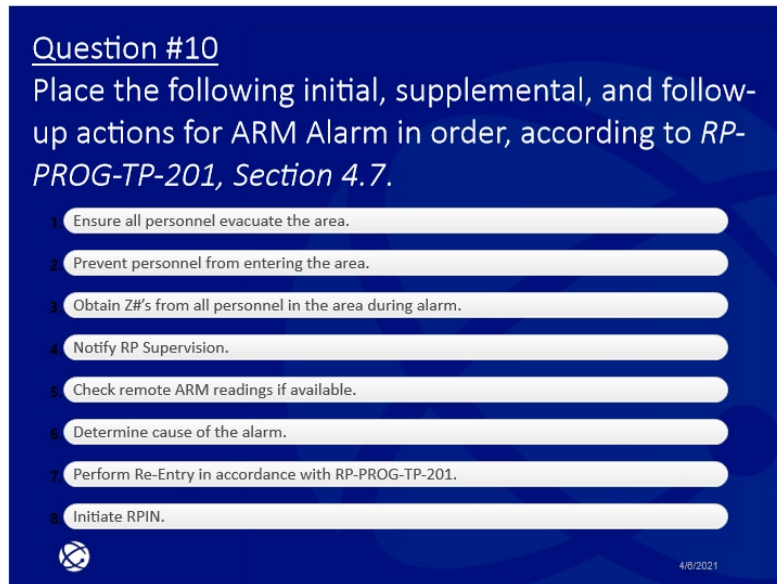
Feedback when incorrect: Items exceeding the limits of P121, Table 14-2 are not to be removed from or stored outside of controlled areas without additional action.

4.11 Question #10 (Sequence Drag-and-Drop, 10 points, 1 attempt permitted)

Place the following initial, supplemental, and follow-up actions for ARM Alarm in order, according to RP-PROG-TP-201, Section 4.7.

Question #10
Place the following initial, supplemental, and follow-up actions for ARM Alarm in order, according to *RP-PROG-TP-201, Section 4.7*.

- 1 Ensure all personnel evacuate the area.
- 2 Prevent personnel from entering the area.
- 3 Obtain Z#’s from all personnel in the area during alarm.
- 4 Notify RP Supervision.
- 5 Check remote ARM readings if available.
- 6 Determine cause of the alarm.
- 7 Perform Re-Entry in accordance with RP-PROG-TP-201.
- 8 Initiate RPIN.



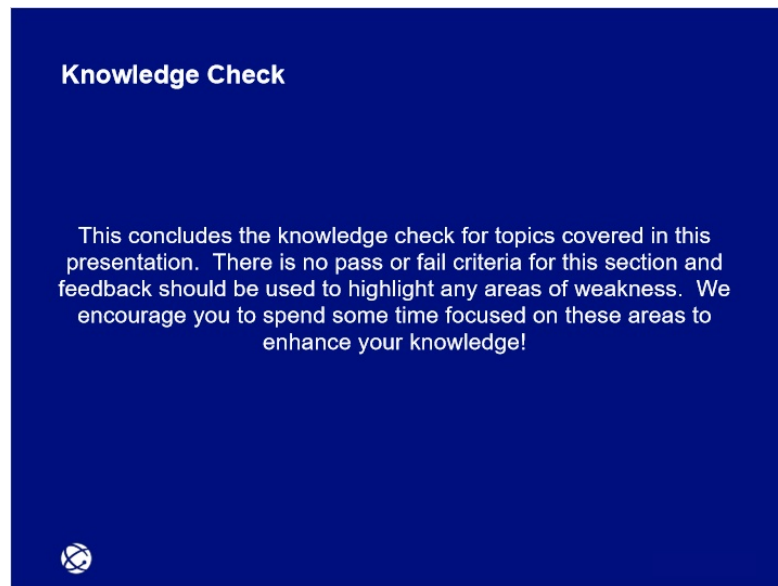
4/8/2021

Correct Order
Ensure all personnel evacuate the area.
Prevent personnel from entering the area.
Obtain Z#’s from all personnel in the area during alarm.
Notify RP Supervision.
Check remote ARM readings if available.
Determine cause of the alarm.
Perform Re-Entry in accordance with RP-PROG-TP-201.
Initiate RPIN.

Feedback when correct: That's right! You selected the correct response.

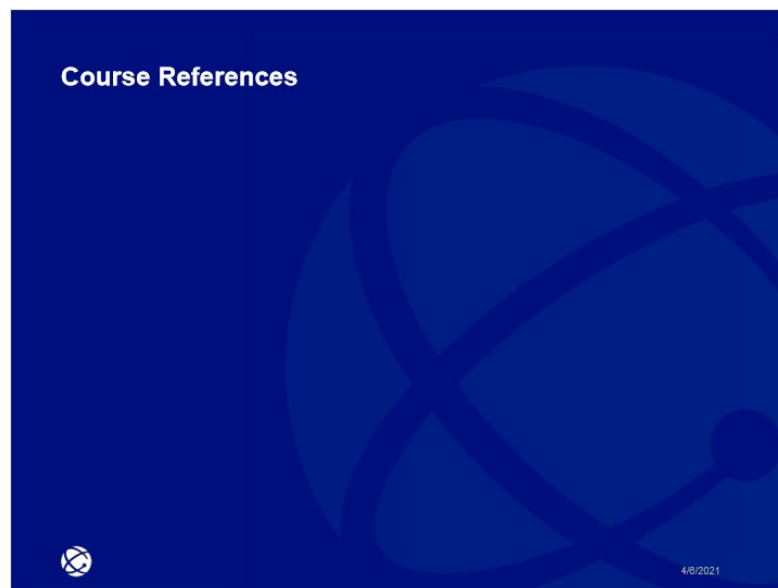
Feedback when incorrect: Please review RP-PROG-TP-201, Section 4.7.

4.12 Knowledge Check Summary



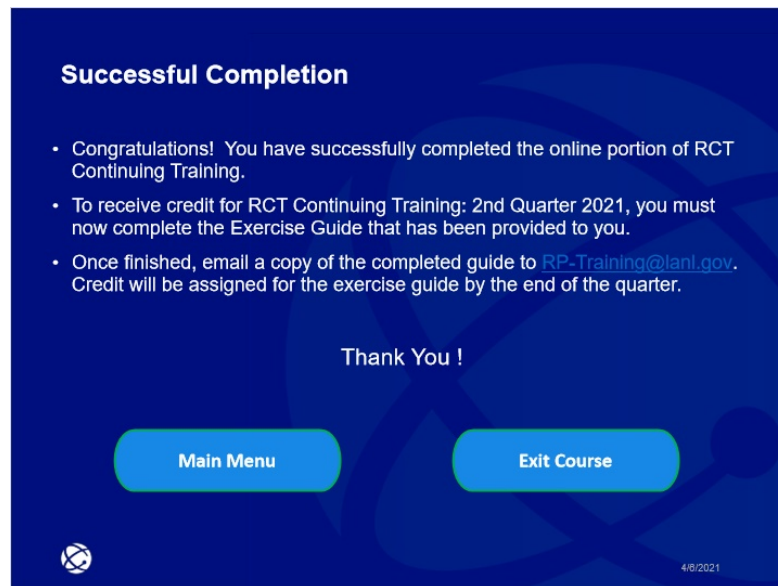
5. Conclusion Scene

5.1 Course References



Notes: References are set to scroll across the screen for 15 seconds before progressing to the Course Completion Slide.

5.2 Conclusion




Successful Completion

- Congratulations! You have successfully completed the online portion of RCT Continuing Training.
- To receive credit for RCT Continuing Training: 2nd Quarter 2021, you must now complete the Exercise Guide that has been provided to you.
- Once finished, email a copy of the completed guide to RP-Training@lanl.gov. Credit will be assigned for the exercise guide by the end of the quarter.

Thank You !

Main Menu Exit Course

 4/8/2021

RCT Continuing Training: 2nd Quarter 2021 Transcript

Slide 1.1 – Main Slide

(LANL Title Page)

Slide 1.2 – Contents Page

“Welcome to RCT Continuing Training, Second Quarter twenty, twenty-one. This quarter’s training assignment is split into two sections. Section one will review the fundamental elements of removing items from controlled areas. This section discusses each decision point and the required actions to determine if an item is suitable for release. Section two briefly reviews Area Radiation Monitors, commonly referred to as ‘ARMs’, and discusses the required actions to take in the event of an ARM alarm.”

Slide 1.3 – Course Expectations

“This course consists of two parts, viewing this online lecture and completing the associated exercise guide. The online lecture will review Item Removal, Area Radiation Monitors, and responding to ARM alarms. The second portion of this training is an exercise guide, which can be found in one of three places: in the initial email sent out for continuing training, on U-Train by accessing U-Train #51946, or by clicking on the provided link within this presentation.”

Slide 1.4 – Course Credit

“To receive credit for this course, you must view the entirety of this presentation. Upon completion, credit for the online portion should reflect immediately in U-Train.

Afterwards, you will need to work through the exercise guide, and return the completed document to RP-Training@lanl.gov. Submissions will be reviewed and credit will be assigned. Please allow 3-5 days for processing submissions.”

RCT Continuing Training: 2nd Quarter 2021 Transcript

Slide 1.5 – What’s in it For Me?

“As an RCT, you are responsible for proper clearance of items and are a resource to our customers across the lab on this matter. This training will refresh you on the requirements associated with the various kinds of item release and the required documentation to release items from radiological control.

Additionally, you may be called on to work in areas and on jobs that have Area Radiation Monitors. This training will refresh you on the fundamentals of ARMs and how to respond to alarms.”

Slide 1.6 – Terminal Learning Objectives

“Terminal Learning Objectives:

One, given the need to perform duties as a RCT, recognize the requirements for item removal in accordance with RP-PROG-TP-200 and P121.

Two, given an area radiation monitor alarm, recognize the response requirements of a RCT in accordance with RP-PROG-TP-201.”

Slide 1.7 – Enabling Learning Objectives

“Enabling Learning Objectives:

One, define the terms related to item removal.

Two, given radiological conditions, determine the item clearance class.

Three, identify when item removal surveys are required.

Four, describe the use of process knowledge for item release.

Five, explain the process for free release.

Six, review the process to release an item with detectable activity less than table 14-2 values.”

RCT Continuing Training: 2nd Quarter 2021 Transcript

Slide 1.8 – Enabling Learning Objectives Continued

“Seven, list the information to include on a Health Physics Radioactive Material Survey tag when detectable activity is greater than table 14-2 values.

Eight, locate the requirements for packaging and storing radioactive material.

Nine, indicate the time an item requires resurvey when awaiting removal following a free release survey.

Ten, Explain the process for conditional release.

Eleven, describe the initial and supplemental response actions when responding to an area radiation monitor alarm.”

Slide 1.9 – Main Menu

“Click to review each section before continuing on to the Knowledge Check section at the end of this presentation.”

Slide 2.1 – Industry Event Lujan Center 1

“Before we begin this online lecture, let’s take a moment to review an industry event which occurred here at Los Alamos National Lab that demonstrates what could happen if there is a breakdown in item removal practices and radiological controls. In 2012, a scientist working at the Lujan Center inadvertently spread radioactive contamination outside of controlled areas of the facility. The Lujan Center is located at TA-53 and welcomes scientists from all over the world to conduct research there. The contamination originated from a sample container that had previously been used to hold a powder sample made up of intrinsically radioactive technetium.

Days after the initial release, the first indication of a problem resulted from a Personnel Contamination Monitor that alarmed on a worker in an adjacent area.

The nuclide of concern was initially unknown and Technetium ninety-nine, being difficult to detect, was under-reported during early investigative surveys.”

RCT Continuing Training: 2nd Quarter 2021 Transcript

Slide 2.2 – Lujan Center 2

“The item release process in place at TA-53 included a RCT to survey and release OR control the material after irradiation, but was not understood by the scientist to be required at the time of the event.

Typically, opening of containers with dispersible material was to be done inside of a glove-box with RCT coverage.

After being in storage for some time, this container was disassembled for reuse by one of the workers on a benchtop without RCT coverage, which initiated the inevitable chain of events that followed.”

Slide 2.3 – Lujan Center 3

“The final investigation results found contamination spread throughout various uncontrolled areas. According to the federal investigative report, a total of twenty-five people were found to have contaminated personal items, five of which had skin contamination.

The Radiological Assistance Program, or RAP Team, was deployed to survey areas of concern in Colorado, Arizona, and New Mexico.

At least nine homes in New Mexico were found to have Technetium 99 contamination.

All individuals involved were determined to receive less than one milli-rem total dose.”

Slide 2.4 – Lujan Center 4

“The federal investigation concluded with twenty-nine total contributing factors to this event. We can take a look at these to understand and compare to the processes we have in place today.

A few of the major contributors that pertain to RP were:

- Inadequate storing and labeling of radioactive material
- Informal and inconsistent established work controls
- And, a culture where deviation from procedures was normalized.”

RCT Continuing Training: 2nd Quarter 2021 Transcript

Slide 2.5 – Lujan Center 5

“It is important to consider the effectiveness of our RP practices in place. Ask yourself: Is the process we have in place right now sufficient to prevent release of radioactive material?”

The proper labeling and storing of radioactive material will prevent mishandling of items that should be controlled. Workers in the Lujan Center now have reviewed their practices and implemented a streamlined process to control and maintain accountability for all potentially radioactive material.

Consistently adhering to item release standards will give multiple layers of protection against an unintended release.

How we apply process the item removal process is vital to preventing radioactive material from reaching the public. The last line of defense falls on RCTs as they evaluate each item in this process. In this presentation we will review the basic elements that go into item removal.”

Slide 2.6 – Item Removal Terms

“Let’s start by taking a look at the key terms related to item removal. You can find these definitions in RP-PROG-TP-200, Section 1435.1, Table 10; Release, Free-Release or Clearance, and Conditional Release.”

Slide 2.7 – Release Definition

“According to RP-PROG-TP-200, the term “release” applies to item removal from a contamination area, high contamination area, airborne radioactivity area, radiological buffer area, or radiological controlled area. This type of removal ensures the item always remains within a radiologically controlled area.”

Slide 2.8 – Free-Release Definition

“Free-Release, or Clearance, applies to any ***unrestricted release*** of items to the public from a Radiological Buffer Area or Radiological Controlled area; for contamination. Items that are free released must meet release requirements and have documentation to support the release requirements have been met. The terms free-release and clearance are equivalent and can be used interchangeably. The RP Field manual does not address all types of Free-Release. One example of this is the clearance of metals from LANSCE, which requires a special process for release. Requirements for release of metals from LANSCE are covered in RP-SOP-077, *LANSCE Metals Clearance Process*.”

RCT Continuing Training: 2nd Quarter 2021 Transcript

Slide 2.9 – Conditional Release Definition

“The term Conditional Release applies to movement on-site from one radiological area for immediate placement into another radiological area.”

Slide 2.10 – Item Clearance Classes

“Item clearance requirements depend on the location in which the item is used. Government vehicles are held to the same clearance requirements as the areas in which they are used. RP-PROG-TP-200, Section 1435.5, Table 11 establishes item clearance classes for free-release based on location.”

Slide 2.11 – Class 1

“Class 1 is a designation for areas with a high potential for contamination. The areas that fall under this category are Radiological Controlled Areas for contamination that include Contamination Areas, High Contamination Areas, Airborne Radioactivity Areas and Radiological Buffer Areas for contamination. Also, RCA’s for DU or Volume Contamination, Solid waste Management Units, and any other areas of concern.”

Slide 2.12 – Class 1 Surveys

“In accordance with RP-PROG-TP-200, Section 1435.6.2a, Items leaving a class one clearance area must be surveyed for contamination unless they meet the following specific requirements for being released without survey, based on process knowledge alone.”

Slide 2.13 – Class 1 Surveys Continued

“Hand-carried personal items such as notebooks, pagers, and flashlights, only if all of the following conditions are true:

- Items have not come into contact with any potentially contaminated surfaces.
- Items have not entered a CA, HCA, or ARA.
- Items have not left the direct possession of the individual.
- The individual is free from contamination as determined by a properly conducted frisk.”

RCT Continuing Training: 2nd Quarter 2021 Transcript

Slide 2.14 – Class 2

“Class 2 areas have some potential for contamination, but likely below the limits of P121, Table 14-2. These areas are posted as Radiological Controlled Areas for Legacy Contamination.”

Slide 2.15 – Class 2 Surveys

“The individual requesting item release must determine whether the item is affected by legacy contamination. If the requestor determines the item is not affected by legacy contamination, then the item may be released without survey based on process knowledge. If the item is affected by legacy contamination, then the item must be evaluated and surveyed.

Note that the burden to initiate this process often lies with the workers in these areas. Which increases the importance of a clear and open line of communication between RP and our customers. RCTs who are regularly involved and who interact with the workers on a regular basis can be more effective at ensuring that these requirements are met.”

Slide 2.16 – Class 3

“No contamination is expected in Class 3 clearance areas, but it is possible. These are posted as Radiological Controlled Area’s posted for external radiation hazards or for radioactive material storage.”

Slide 2.17 – Class 3 Surveys

“Like class 2, in a class 3 area, the individual requesting item release must determine whether there are any obvious indications of radiological use history for the item. If there is no obvious indication of radiological use history, then the item may be released without survey based on process knowledge, and no documentation is required. If there is obvious indication of radiological use history, then the item must be evaluated and surveyed.”

RCT Continuing Training: 2nd Quarter 2021 Transcript

Slide 2.18 – Process Knowledge

“If the requestor uses process knowledge for item clearance, then you must consider operational records and operating history, including the use of any radioactive materials or radiation generating devices. If process knowledge is used as the sole basis for item clearance, then you must determine the following:

- Whether the item was ever used for activities or in areas that could have caused internal or external contamination.
- And, whether previously contaminated items were decontaminated, met release limits, and were protected from re-contamination.

If process knowledge cannot demonstrate that the items are not contaminated, then surveys must be conducted.”

Slide 2.19 – Item Release Review

“Let’s take a minute to review the major steps that makeup the item removal process from the perspective of an RCT.

- Item removal is requested, based on the requestor’s determination that there is potential for radioactive contamination.
- RCT evaluates item to be removed. Identify area clearance class, consider process knowledge, and determine eligibility for release.
- RCT performs all necessary surveys to include a direct frisk of all accessible external surfaces, and a sufficient amount of removable contamination surveys.
- RCT documents surveys. If the item is to be released, this requires and RP-PROG-FORM-024. If the item is found to include radioactive material, an HPRMS tag should be attached. Some situations may warrant additional documentation with the RP-PROG-FORM-114.”

Slide 2.20 – Item Release Video

All audio is included in pre-recorded video.

RCT Continuing Training: 2nd Quarter 2021 Transcript

Slide 2.21 – RP-PROG-FORM-024

“RP-PROG-TP-200, Section 1435.1, states that if an item meets release limits, item removal must be documented using RP-PROG-FORM-024.”

Slide 2.22 – Item Release with detectable activity

“RP-PROG-TP-200, Section 1435 states that, if any item with detectable activity is to be released, then a deployed RP lead and the requestor must concur on both of the following:

- Release limits have been met
- And, reasonable measures to decontaminate the items have been applied.

A deployed RP Lead will be the HPFC or a designated RCT.”

Slide 2.23 – HPRMS Tags

“If an item is found to have contamination, it should be labeled with a Health Physics Radioactive Material Survey tag. Let’s take a minute to review sections to be filled out on an HPRMS tag.”

RCT Continuing Training: 2nd Quarter 2021 Transcript

Slide 2.24 – Filling out an HPRMS Tag

-Pause between each phrase.

- “Instrument manufacturer, model, number, and calibration due date.
- HPAL barcode number, if applicable.
- Location.
- Item description.
- Primary Nuclides.
- Check all applicable contamination categories.
- Circle either material or inner container based on the contamination surveys taken.
- Record survey results for direct and removable contamination surveys as applicable. Write ‘N’ slash ‘A’ for fields that are not applicable. Write ‘N’, ‘D’, ‘A’ for items with no detectable activity.
- Circle either material or inner container based on the radiation surveys taken.
- Record beta/gamma+neutron survey results in millirem per hour on contact and at 30cm.
- Circle either package or outer container for contamination surveys taken.
- Record removable contamination results for alpha and beta in dpm per 100 cm².
- Circle either package or outer container based on radiation surveys taken.
- Record beta/gamma+neutron survey results in millirem per hour on contact and at 30cm.
- In the comments section, add any amplifying information or specific controls that may be required. Items being tagged for shipping will record the beta/gamma plus neutron reading at one meter here.
- Record your Z#, sign and date as the responsible RCT.
- And finally, HPFC signatures are required for items that are leaving LANL Property.”

Slide 2.25 – Filling out an HPRMS Tag Continued

“Once the tag is filled out, ensure that all information was transferred and is legible on the yellow cardstock tag. Remove the perforated sheets and maintain the original copy with radiological survey records. Attach the yellow cardstock tag to the material and provide the requestor with a copy of the tag if desired. Once attached, HPRMS tags may only be removed by or under direction of RP Personnel.”

RCT Continuing Training: 2nd Quarter 2021 Transcript

Slide 2.26 – Packing and Storing RAM

“Radioactive material must be packaged and stored so that the package integrity is maintained to prevent release of contamination; higher risk materials require more robust packaging. Click next to review factors that must be considered by the RLM and the person storing radioactive material.

Slide 2.27 – Packaging and Storing RAM Continued

“Packing and storage requirements in accordance with P121, Section 1722.3 state that the following factors must be considered by those packaging and storing radioactive material:

- Source term
- Area designation
- The storage area
- Package integrity
- Sharp edges
- Potential for individuals to be exposed
- And, ALARA measures”

Slide 2.28 – Removing Items after Survey

“Items should be removed from the area immediately or staged for removal in a way that would not risk contamination and invalidate recent surveys. RP-PROG-TP-200 states that if not removed promptly after surveys, then the deployed RP Lead must be consulted to ensure that appropriate controls are implemented to prevent potential contamination of the surveyed item.”

Slide 2.29 – Conditional Release

“Items that cannot be decontaminated below the limits of P121, Table 14-2, cannot be free-released. Some items may still have a useful purpose and should not be disposed of as radioactive waste. A conditional release allows you to move items like this between radiological Controlled Areas, given that the proper monitoring and controls are exercised.”

RCT Continuing Training: 2nd Quarter 2021 Transcript

Slide 2.30 – LANL Event 1

“In 2020, two Ludlum model 215 detectors were sent to RIC for repair with out of service tags noting continuous chirping. RP-Services personnel investigating the cause, discovered removable contamination on the detectors at TA-36.”

Slide 2.31 – LANL Event 2

“One detector was determined to have six-hundred dpm, and the other one-thousand dpm per smear. Instrument out of service tags include a checkbox that communicate the required survey results are less than the applicable limits of P121, table 14-2. RCTs who check this box acknowledge that they have surveyed and verified each instrument to be less than the table 14-2 limits.”

Slide 2.32 – LANL Event 3

“Fortunately, no personnel or uncontrolled areas were found to be contaminated during this event. Corrective actions included additional RCT training and review of procedures associated with item release.

Combining proper survey techniques with procedure use and adherence helps to prevent releasing contaminated instruments to uncontrolled areas. Personnel responsible for surveying and releasing instruments must understand the requirements and risks involved with item clearance.

You may click on the picture link to learn more about this event.”

Slide 2.33 – Item Removal Summary

“Los Alamos National Laboratory is a uniquely important part of society on a national scale, and specifically the surrounding areas of Northern New Mexico. The release of potentially radioactive materials has a direct impact on the Laboratory’s mission to protect the environment and the public. It is imperative that every RCT performing item release does so thoroughly, consistently, and documents the process accurately. The fundamental skills practiced in this activity are designed to protect you, your coworkers, the Lab, as well as everyone in our community from potential radiological hazards.”

RCT Continuing Training: 2nd Quarter 2021 Transcript

Slide 3.1 – Area Radiation Monitors

“Area Radiation Monitors, or ARMs, are used at facilities across the laboratory to continuously survey specific areas for abnormal or high exposure rates. Here are just a few of the types you may see.”

Slide 3.2 – ARM Alarm Initial Response

“In accordance with RP-PROG-TP-201, an ARM alarm requires all personnel to immediately evacuate the area and prevent personnel from entering the area.”

Slide 3.3 – ARM Alarm Supplemental and Follow-up

“Here are the Supplemental and follow up actions for an Area Radiation Monitor Alarm:

- Obtain the names and Z numbers of all personnel in the area at the time of the alarm.
- Notify the HPFC, Team Leader, and management as appropriate, AND request assistance as needed.
- Management shall evaluate the potential for exposures and determine whether to expedite dosimetry results.
- Check ARM remote indicators if available.
- Determine the cause of the ARM alarm.
- Perform re-entry
- And, Initiate a Radiation Protection Initial Notification.”

Slide 3.4 – ARM Summary

“Area Radiation Monitors are in place to alert us of potentially dangerous conditions and in the event of an alarm, immediate action is required to ensure the safety of everyone in the area.”

Slide 4.1 – Knowledge Check Intro

“Credit for this presentation is allotted based on participation and completion of each section. The following questions are intended to be used as a “self-check,” and are designed to help you identify areas for review.”

RCT Continuing Training: 2nd Quarter 2021 Transcript

Slide 4.2 – Question #1 -No Audio

Slide 4.3 – Question #2 -No Audio

Slide 4.4 – Question #3 -No Audio

Slide 4.5 – Question #4 -No Audio

Slide 4.6 – Question #5 -No Audio

Slide 4.7 – Question #6 -No Audio

Slide 4.8 – Question #7 -No Audio

Slide 4.9 – Question #8 -No Audio

Slide 4.10 – Question #9 -No Audio

Slide 4.11 – Question #10 -No Audio

Slide 4.12 – Knowledge Check Summary

“This concludes the knowledge check for topics covered in this presentation. There is no pass or fail criteria for this section and feedback should be used to highlight any areas of weakness. We encourage you to spend some time focused on these areas to enhance your knowledge!”

Slide 5.1 Course References

-No Audio

Slide 5.2 Course Completion

“Congratulations! You have successfully completed the online portion of RCT Continuing Training. To receive credit for RCT Continuing Training: 2nd Quarter 2021, you must now complete the Student Exercise Guide that has been provided to you. Once finished, email a copy of the completed guide to RP-Training@lanl.gov. Credit will be assigned for the exercise guide by the end of the quarter.”